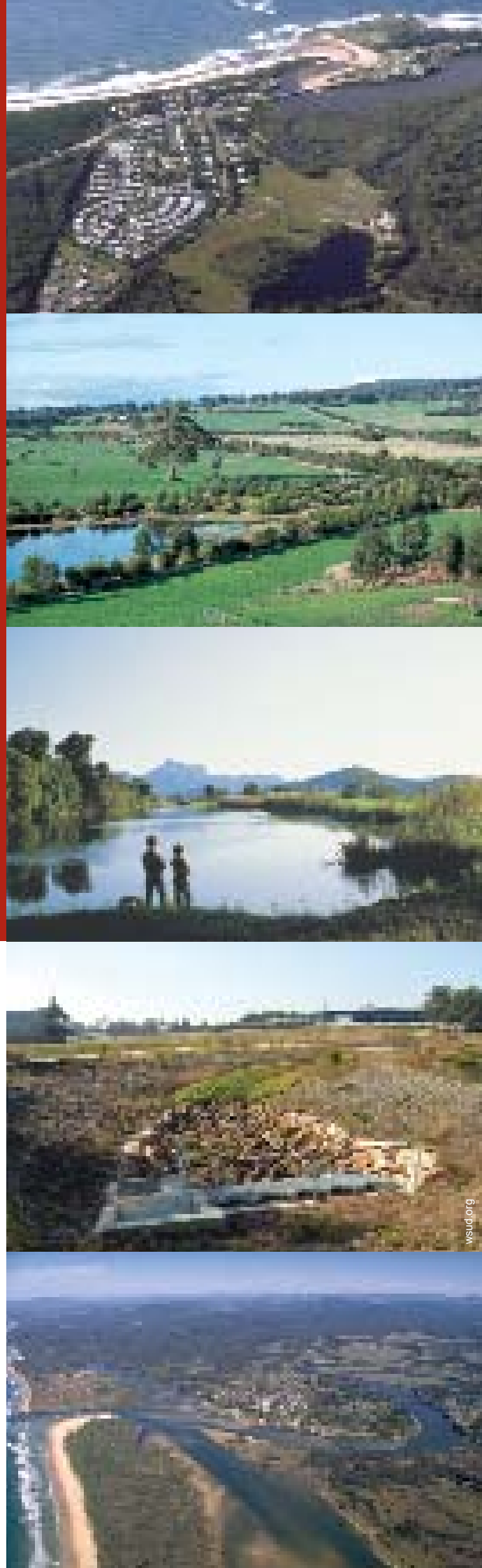


# Local planning for healthy waterways

## using NSW Water Quality Objectives



wsud.org

**T**his booklet outlines how incorporating water quality objectives into strategic planning of development is a key way that local councils – as well as state government agencies, developers and the community – can contribute to improving the health of waterways.

According to a major study of the community's attitudes to the environment (DEC 2004), water quality is the most important issue for the NSW community, with water conservation and management topping their list of major concerns.

Responsibility for ensuring healthy waterways and protecting water quality in catchments is shared between the community and all levels of government, from federal and state to catchment management authorities and local government.

Recognising the community's environmental values and uses for waterways, the NSW Government and the community have agreed upon Water Quality Objectives for each catchment.

Development can contribute to meeting these objectives by following siting and design principles and achieving reasonable levels of performance that protect our waterways. Local councils can contribute significantly by building the principles in this brochure into their local environmental plans, development control plans and assessment of development proposals.

Many councils and state agencies are already applying these planning principles to protect waterways and this booklet draws on their experience. By adopting these suggestions more widely in the strategic planning process, local councils can play a crucial role in supporting the community's values for our waterways.

This booklet:

- provides an outline of water quality management in NSW and answers some frequently asked questions about water quality in catchments
- outlines a simple and practical six-step process for councils looking to establish a strategic planning approach for improving the health of waterways.

## What you need to know about water quality management

In Australia, the national guidelines for managing water quality in ambient waterways are known as the 'ANZECC guidelines'. ANZECC – the Australian and New Zealand Environment Conservation Council – published the guidelines in 2000.

Ambient waters include rivers; creeks; streams; lakes; estuaries and coastal marine waters; and even some artificial waterways that have value for the community or ecosystems.

The ANZECC guidelines establish:

- a generic set of environmental values and human uses for waterways
- technical methods for assessing and measuring whether waterways support these values.

The NSW Water Quality Objectives (WQOs) recognise the community's environmental values and uses for ambient waters. They were adopted by the NSW Government in 1999 and similar objectives for marine waters followed in 2005. The WQOs use the ANZECC framework to establish and recognise the community's environmental values for each catchment in NSW.

Taken together, they provide a framework for understanding the potential impact of a development on the community's values, and allow planners in local councils to play a vital role in protecting or restoring environmental values through the strategic planning process.

## Local strategic planning for healthy waterways

### Catchment water quality is a local planning issue

Councils play a number of roles that can influence the health of our waterways, including:

- strategic planning
- development consent
- environmental regulation under the *Protection of the Environment Operations Act 1997* (POEO Act), the *Environmental Planning and Assessment Act 1979* (EP&A Act) and other legislation
- the management and treatment of sewage and stormwater
- working with the community on environmental education and practical projects.

In preparing regional strategies and environmental plans, local councils can develop principles for zoning that identify opportunities for improving water quality as well as assessing the risks posed by different levels and types of development.

## How Water Quality Objectives help in strategic planning

Local councils can use the development planning process to help prevent impacts on water quality by:












- ensuring that the agreed community values and uses for our waterways, such as boating and swimming, are recognised as objectives and considered in the planning process
- identifying zones that protect rivers, other waterways, wetlands and sensitive landscapes from surrounding land uses
- identifying areas where high-risk developments should not be allowed or where they would require careful management and conditions
- ensuring that developments achieve reasonable environmental performance levels that are sustainable, practical, and socially and economically viable.

## Water Quality Objectives: the community's values

As stated earlier, the WQOs recognise the community's environmental values and uses for ambient waters, which were endorsed for rivers and estuaries, by the NSW Government in 1999 after extensive consultation with the community.

The WQOs aim to protect these uses and values. Note, however, that in some waterways, not all the WQOs apply.

**Uses and values protected by Water Quality Objectives**

 Aquatic ecosystems	 Irrigation water supply
 Aquatic foods (cook before eating)	 Livestock water supply
 Drinking water at point of supply	 Primary contact recreation
 	 Secondary contact recreation
 Homestead water supply	 Visual amenity

In some waters and for some aspects of water quality and river health, the WQOs are already being achieved and should continue to be protected.

In other waterways, some or all of the objectives are not being achieved, but the community has indicated they should be long-term goals. All activities and development should contribute to their achievement over time. The time frame for achieving them will depend on the current condition of the

## ANZECC guidelines and ambient water quality

The key reference for assessing whether the condition of a waterway meets recognised environmental values is the Australian and New Zealand guidelines for fresh and marine water quality, known as the 'ANZECC guidelines'.

These national guidelines were developed by the federal and state governments, drawing on the best scientific expertise. The guidelines provide a suite of techniques for assessing the biological, physical and chemical condition of waterways, including numerical guideline levels for key indicators of water quality. They are widely recognised and used by governments, environmental managers, consultants and industry.

The ANZECC guidelines and the NSW WQOs apply to ambient water bodies. They should not be used directly to specify numerical conditions, limits or standards for a development or at the boundary of an individual site.

This is because:

- The numerical trigger values in the ANZECC guidelines are derived and designed for assessing ambient waters and not as regulatory design or discharge standards.
- There are many (diffuse and point) sources in a catchment that contribute to ambient water quality – all sources should contribute to the protection or achievement of WQOs over time.
- There are many aspects of development, other than treatment and discharge, that determine whether water management will support environmental values in ambient waters. Siting, design and measures for recycling and reuse can all be considered.
- It may not be equitable to require one activity alone to restore ambient water quality for environmental values, unless it is clearly identified as the only activity affecting water quality or as having by far the greatest impact on water quality.
- It is widely recognised that planning decisions must take into account a range of factors, such as practical viability and economic, social and other environmental considerations.

waterway and the practical and economic feasibility of restoring the waterway or reducing impacts on it. It is not acceptable for developments or activities to implement a lesser level of environmental performance, simply because the waterway is currently degraded.

Find out which WQOs apply to your waterway by visiting [www.environment.nsw.gov.au/ieo](http://www.environment.nsw.gov.au/ieo)

## Role of catchment management authorities in NSW

NSW has 13 catchment management authorities (CMAs) which play a central role in setting catchment targets and identifying primary risks and pressures on water quality.

CMAs contribute to the WQOs by targeting investment to areas of high priority for water quality.

For more information about the role of CMAs:

- see the brochure *Investing in our catchments: Water quality and its role in river health* (DEC 2004)
- visit [www.cma.nsw.gov.au](http://www.cma.nsw.gov.au)

## Using the Water Quality Objectives in strategic planning

Local councils can use the development planning process to prevent impacts on water quality and improve catchment health. This approach, which consists of the six related steps listed below, can be more effective than trying to manage the small, cumulative impacts from individual urban developments:

1. Recognising the community's values for waterways in local environmental plans (LEPs)
2. Assessing the current condition of waterways
3. Identifying significant risks to water quality
4. Identifying zones that protect river corridors, wetlands and sensitive landscapes
5. Planning for higher risk developments
6. Setting benchmarks for design and best practice.

Each of these steps is explained below.

### 1. Recognising the community's values for waterways in local environmental plans (LEPs)

The WQOs reflect the community's agreed environmental values for each catchment in NSW within the framework of the national guidelines. The objectives for each catchment can be found at [www.environment.nsw.gov.au/ieo](http://www.environment.nsw.gov.au/ieo). Like the ANZECC trigger values, they are not regulatory in themselves, but can be readily included in local environmental plans and development control plans (DCPs) as high-level objectives. This ensures that the WQOs are considered in planning decisions.

They can be used as guidelines to:

- provide a benchmark to assess the potential impacts of a development on ambient water quality
- encourage a reasonable level of performance towards achieving the WQOs in ambient waters
- provide a basis for comparing different options to meet water quality goals.

For example, a LEP could nominate an objective such as: 'to recognise the environmental values of water by considering how development can maintain or restore those values, including those identified in the existing Water Quality Objectives and River Flow Objectives.'

The environmental values of water are defined in the POEO Act as:

'... the environmental values of water specified in the *Australian and New Zealand guidelines for fresh and marine water quality* (2000), published by the Australian and New Zealand Environment Conservation Council.'

It may be appropriate to insert clauses into specific zones of an LEP, such as waterway protection zones, requiring proposed developments in those zones to specifically consider the environmental values of the waterway and the practical measures that could be taken to maintain or restore those values.

### 2. Assessing the current condition of waterways

To be effective in meeting environmental goals, local planning needs information about the:

- current condition of the waterway – does it support the community's values expressed in the WQOs?
- key pressures on waterway health – how can these be managed through land-use planning and development?
- risks to water quality – what are the significant pollutants, types of activities and developments, and point and non-point sources of pollution?

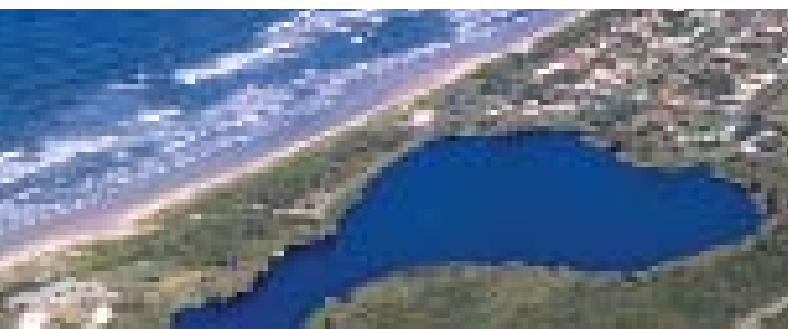
Councils should consider the condition of waterways when gathering information or conducting background studies for an LEP or DCP. New assessments may not be necessary, as many councils have already undertaken water quality studies, and other relevant information may be available from existing sources.

#### About AUSRIVAS

The Australian River Assessment System (AUSRIVAS) is an efficient technique for accurately assessing the health of a waterway. It uses data about aquatic macroinvertebrates ('bugs') and the physical environment collected on a single visit to assess the environmental condition of a waterway. This kind of rapid assessment of water quality is faster and easier than traditional physico-chemical methods because:

- fewer site visits are required
- laboratory costs are lower
- it more directly measures the overall health of a waterway.

A rapid assessment can be used to identify priority waterways for protection or restoration across a planning area.



### Using and finding water quality information

The condition of waterways can be gauged by comparing the available data with the ANZECC guidelines. For the physical and chemical assessment of water quality, the ANZECC guidelines provide 'trigger values' – numerical or descriptive criteria for ambient water quality – that help to assess whether community values are being achieved.

Where water quality is well within the trigger values, councils can be reasonably sure that the WQOs are being achieved. Where water quality is beyond these trigger values, there is a risk that the environmental value is not being achieved. In this case the ANZECC guidelines recommend action to address the cause or further investigation, where appropriate to refine the trigger values to reflect natural local variation in the environment.

For more information about the ANZECC guidelines, see *Using the ANZECC guidelines and water quality objectives in NSW* (DEC 2006).

Information	Web address
Water Quality Objectives	<a href="http://www.environment.nsw.gov.au/ieo">www.environment.nsw.gov.au/ieo</a>
ANZECC guidelines	<a href="http://www.deh.gov.au/water/quality/nwqms">www.deh.gov.au/water/quality/nwqms</a>
Department of Natural Resources	<a href="http://www.dnr.nsw.gov.au">www.dnr.nsw.gov.au</a>
CMAs	<a href="http://www.cma.nsw.gov.au">www.cma.nsw.gov.au</a>
Waterwatch	<a href="http://www.waterwatch.nsw.gov.au">www.waterwatch.nsw.gov.au</a>
Streamwatch	<a href="http://www.streamwatch.org.au">www.streamwatch.org.au</a>
AUSRIVAS	<a href="http://ausrivas.canberra.edu.au">ausrivas.canberra.edu.au</a>
NSW Natural Resource Atlas (formerly CANRI)	<a href="http://www.nratlas.nsw.gov.au">www.nratlas.nsw.gov.au</a>

### 3. Identifying priority risks to water quality

There are three complementary ways for councils to identify priority risks for water quality:

- reviewing existing and potential activities
- using conceptual models
- using predictive models and decision-support tools.

#### Reviewing existing and potential activities

Councils can identify activities in a catchment that are likely to generate pollutants or pose risks to water quality if they are not managed properly. For instance:

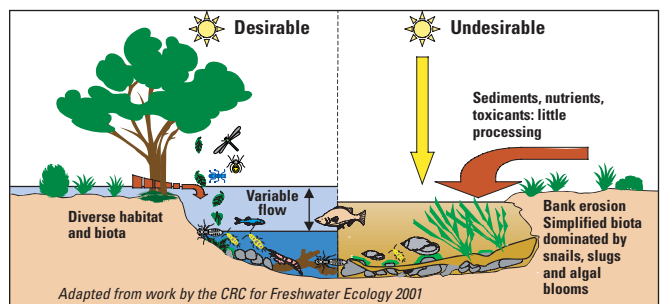
- development could lead to stormwater impacts, such as changes in flow regime and nutrient and sediment runoff to waterways

- all types of development can have severe impacts on the health of waterways during the construction phase unless this is carefully managed
- industrial development could lead to runoff of pollutants if not managed appropriately
- different types of development pose different risks from potential pollutants, for example:
  - intensive agriculture may require management of effluent in wastewater and stormwater and consideration about whether the site is suitable for the retention and irrigation of effluent
  - a manufacturing facility may require attention to prevent contamination of runoff with toxicants from plastics and paints.

### Using conceptual models

Conceptual models are simple diagrams showing how processes in a catchment or waterway can affect water quality and river health. The advantage of simple conceptual models is that they do not need to be computer-based and can be readily understood by non-technical people. They can also be applied where there is little data and so offer a tool to consider water quality in any waterway. They help to clearly identify how land-use planning can improve water quality by understanding the factors influencing water quality and river health.

Conceptual models, such as the cross-section of a stream shown below can be used to identify and simplify the cause-effect relationships that influence water quality and river health. These models complement existing water quality data or can be applied even where there is no data. By using them to identify risks, the land-use planning actions needed to support or improve water quality can become clearer.





Conceptual models have been used:

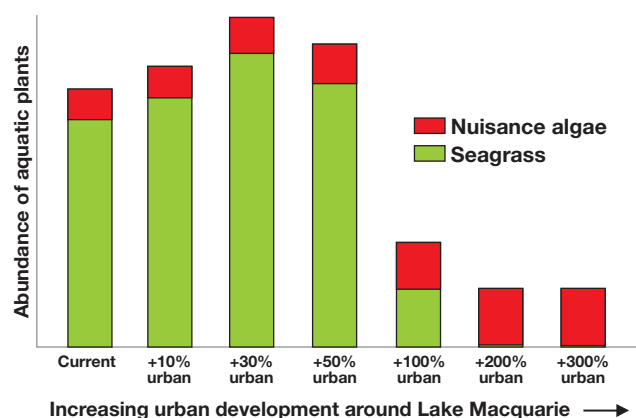
- to assess stormwater impacts from new developments in western Sydney
- to identify and target key catchment risks for drinking water supply
- to assess the consequences of different environmental flow regimes in the Hawkesbury–Nepean River
- as part of designing monitoring programs like the Sustainable Rivers Audit in the Murray–Darling Basin.

### **Predictive models and decision support tools**

Predictive computer models and decision-support tools are being developed that demonstrate the impact of different management (or development) scenarios on water quality. For example, computer models are available to:

- help target catchment rehabilitation activities to the most cost-effective areas
- identify where land-use changes will have little effect on water quality
- identify critical pollutant load thresholds for sensitive coastal lakes.

An important contribution to predictive models has been the sustainable-loads modelling approach developed for coastal lakes by the Department of Conservation NSW, and released in January 2006. This approach allows local councils, planning authorities and catchment managers to quantify the relationship between changed catchment activities and ecological responses. For example, it has been used to explore the effects of different catchment developments on nutrient loads in Lake Macquarie (see graph below) since nutrient pollution is one of the factors that cause blooms of nuisance algae in lakes.



An example of the sustainable-loads modelling approach: responses of nuisance algae and seagrass in Lake Macquarie to differing levels of urban development.

### **Water-sensitive urban design**

Traditional urban residential development without stormwater treatment can cause increases in flow event peaks while also increasing the loads of nutrients and sediment delivered to waterways.

The emerging principles of 'water-sensitive urban design' (WSUD) aim to minimise the effect of urban developments on the natural water cycle and flow regimes in catchments through techniques such as source controls (for example rainwater tanks), retention basins, constructed wetlands and the reduction of hard (impervious) surfaces.

For more information, see *Managing urban stormwater* at [www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater) and [www.wsud.org](http://www.wsud.org).

### **4. Identifying zones that protect river corridors, wetlands and sensitive landscapes**

Identifying buffer zones is one of the most significant contributions that strategic land-use planning can make to support the WQOs. The specified zones help to protect river corridors, wetlands and sensitive landscapes from inappropriate land uses. They can be identified at the regional scale or more locally through an LEP, using steps 2 and 3 above.

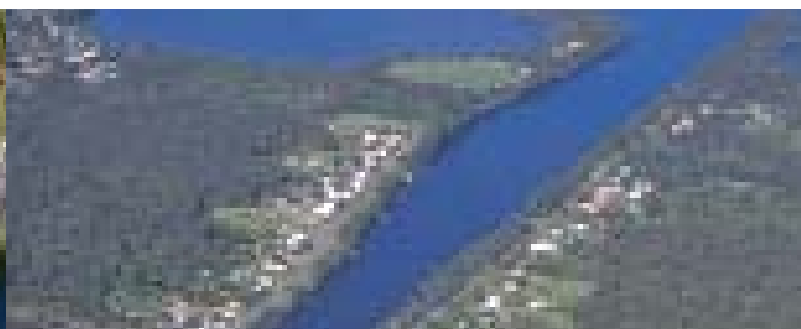
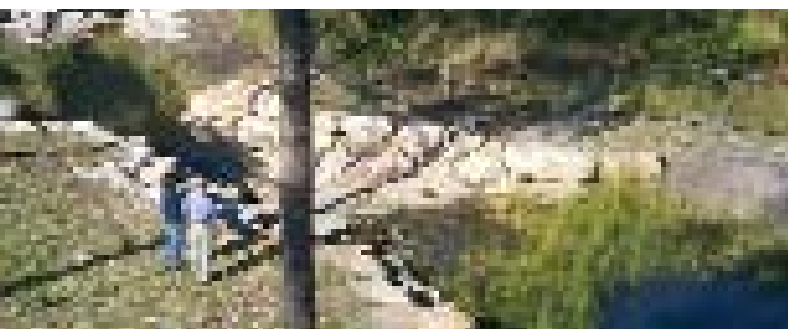
Water quality and the health of waterways can be dramatically improved where buffer zones of natural vegetation are reserved or restored. Water-sensitive urban design, for example, adopts this approach in planning and managing stormwater.

Once identified in plans, buffer zones around rivers, streams, wetlands, lakes and estuaries can be protected with planning controls such as setbacks or vegetation protection.

Similarly, planning controls can protect other sensitive parts of the landscape, such as steep slopes and acid sulfate soils, that can affect water quality and river health if developed inappropriately.

### **5. Planning for higher risk developments**

Strategic plans can identify sensitive locations where certain types of development would be inappropriate, because of their risk to water quality. They can also identify locations that are more suited to certain types of development and activities, and where landscape conditions would minimise any resulting impacts on water quality.



Many councils have identified and designated areas such as special planning zones. Examples include siting industrial developments on flat land where it is easier to prevent, capture or treat contaminated runoff, or having buffer zones around sensitive wetlands. A strategic plan can identify those areas that meet the twin objectives of development and protection.

In this way, strategic plans and planning instruments offer an opportunity to guide both investors and the community about the best location for different types of development.

## 6. Setting benchmarks for design and best practice

Once the location for a development has been determined, the next stages, such as selecting the design and identifying ongoing activities of the development, provide further opportunities for considering the effect on water quality and river health. Strategic plans can help to ensure that these impacts are minimised by setting performance benchmarks. Developers can reduce their costs by using available design and management techniques for improving water control, for example:

- From a social, environmental and economic perspective, some aspects of water-sensitive urban design may be cost-neutral or cheaper than traditional stormwater design.
- Increasing stormwater infiltration by reducing the area of impermeable surfaces in an area allows smaller (and therefore cheaper) stormwater pipes to be used.
- Designing industrial and commercial development to reduce generation of stormwater runoff and/or prevent its contamination can reduce costs of water management and treatment.

Additionally, providing and maintaining well-planned and designed stormwater control measures in new developments is significantly cheaper than retrofitting controls and management measures in established developments once water quality problems have arisen.

Planning instruments can also require developments to achieve specified levels of performance in terms of water quality outcomes, while giving developers the flexibility to decide how to meet them at each site.

### **Managing urban stormwater**

The *Managing urban stormwater series* (DEC 2006) provides techniques for defining practical stormwater management objectives that contribute to the community's values and the WQOs. These techniques can be applied to individual development proposals within a catchment.

Defining the desired stormwater characteristics – in terms of both the quality and quantity of water runoff from existing or proposed development areas – will contribute to meeting the objectives, while considering what developers can practically achieve with 'best practice' water-sensitive urban design at each site.

The *Managing urban stormwater* framework offers the potential for councils to nominate simple outcome-based targets in LEPs, DCPs and other planning instruments. Developers may then undertake more detailed analysis to develop site-specific requirements that meet these broader objectives.

It is now widely accepted in the community that development proponents should implement a reasonable level of performance and good practice in many aspects of the development. For example, the NSW Building Sustainability Index (BASIX) has set mandatory targets for water use and energy savings for individual developments, while allowing developers to select from a range of options about how this is achieved.

The current development of new procedures for defining stormwater targets will enable local councils to set similar benchmarks that promote water quality and ecosystem protection and health.

### **Is further assessment necessary at the DA stage?**

Local councils assess all development proposals under the EP&A Act. This Act allows councils to request developers to further assess the environmental impact of a proposal if they consider this is appropriate, such as for high-risk or major developments. These may include developments that:

- are designated under the EP&A Act
- require an environment protection licence under the POEO Act
- are identified by determining authorities as requiring more intensive assessment.

For such developments, the WQO framework and the ANZECC guidelines provide for more detailed assessment towards understanding the potential impact of an individual development on the community's values for our waterways. The same principles apply – that they should contribute to protecting environmental values, where these are currently achieved, or to restoring them over time, where they are not. A more detailed assessment should consider the reasonable level of performance that can be achieved by siting, designing and carrying out the development to contribute to environmental values of waterways.



## References and further reading

ANZECC/ARMCANZ 2000, *Australian and New Zealand guidelines for fresh and marine water quality*, Department of Environment and Heritage, Canberra, available at [www.deh.gov.au/water/quality/nwqms](http://www.deh.gov.au/water/quality/nwqms).

Baginska B, Lu Y, Mawer D and Pritchard T 2004, *Linking land-use decisions to nutrient exports*, Final report, Comprehensive Coastal Assessment Study, Department of Environment and Conservation NSW, Sydney.

Department of Environment and Conservation NSW Sydney, 2003, *Cleaner production*, available at [www.environment.nsw.gov.au/cleaner\\_production/index.htm](http://www.environment.nsw.gov.au/cleaner_production/index.htm).

Department of Environment and Conservation NSW Sydney, 2003, *Solutions to pollution – Guidance for small business*, available at [www.environment.nsw.gov.au/small\\_business/index.htm](http://www.environment.nsw.gov.au/small_business/index.htm).

Department of Environment and Conservation NSW Sydney, 2004, *Investing in our catchments: water quality and its role in river health*.

Department of Environment and Conservation NSW, Sydney, 2004, *Who cares about the environment in 2003?*, available at [www.environment.nsw.gov.au](http://www.environment.nsw.gov.au).

Department of Environment and Conservation, NSW, Sydney, 2006, *Managing urban stormwater series*, various titles.

Department of Environment and Conservation, NSW, Sydney, 2006, *Marine water quality objectives for NSW ocean waters*, available at [www.environment.nsw.gov.au/water/mwqo](http://www.environment.nsw.gov.au/water/mwqo).

Department of Environment and Conservation, NSW, Sydney, 2006, *Using the ANZECC guidelines and Water Quality Objectives in NSW*.

Department of Local Government NSW 2006, *On-site sewage management for single households*, Sydney.

Landcom 2004, *Managing urban stormwater (MUS): Soils and construction*, Volume 1 (4th edition), Sydney.

NSW Government 1999, Sydney, *Environmental objectives for water quality and river flow*, available at [www.environment.nsw.gov.au/ieo](http://www.environment.nsw.gov.au/ieo).

Sanderson BG and Coade G 2006, *NSW coastal lakes' and estuaries' response to nutrient loading, Final report. Comprehensive Coastal Assessment Study*, Department of Environment and Conservation NSW, Sydney.

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